ID: B-3453

CONTRACT:

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3453	1	17

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
33073.1.1	BRSTP-301(10)	PE
33073.2.1	BRSTP-301(10)	R/W, UTILITIES

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

CONTENTS:

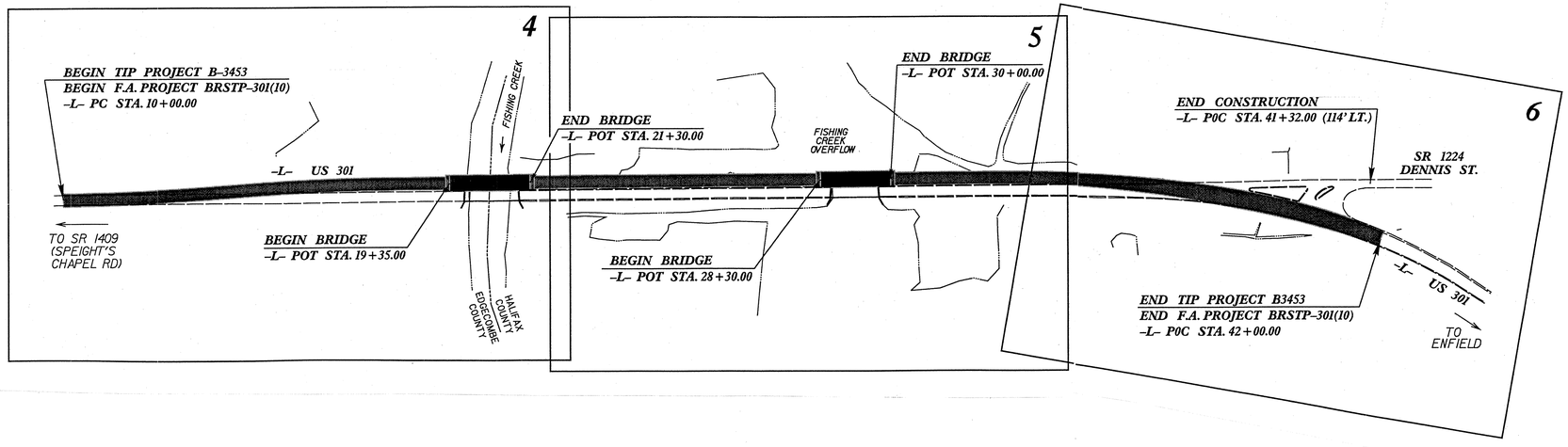
LINE		STATION			SHEET NO.
-L-		10+00	TO	42+00	4-6
-L-	X-SECT	10+00	TO	41+50	7-17
-Y-		10+00	TO	15+50	6
-Y-	X-SECT	10+00	TO	15+50	14-17

STATE PROJECT 33073.1.1 **I.D. NO.** B-3453

F.A. PROJECT BRSTP-301(10)

COUNTY EDGECOMBE / HALIFAX

DESCRIPTION BRIDGE NO. 23 OVER FISHING CREEK AND BRIDGE NO. 17 OVER FISHING CREEK OVERFLOW APPROACHES ON US 301 (INVENTORY)



CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

INVESTIGATED BY JRM **PERSONNEL** KBM

CHECKED BY JRM LWD

SUBMITTED BY RRW RES

DATE APRIL, 2003 JAH

MMH

NORTH CAROLINA LICENSED SEAL 254 GEOLOGIST ROBERT RAY WHITE SEAL

Robert Ray White
SIGNATURE

DRAWN BY: JRM

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3453	8.1301801	2	17

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING # 10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT / PLASTIC INDEX	6 MX		N.P.	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE IN.: 12" | 3"

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE
UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- SPRING OR SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- ☐ MOBILE B-___
- ☐ BK-51
- ☐ CME-45B
- ☐ CME-550
- ☐ PORTABLE HOIST
- ☐ OTHER _____
- ☐ OTHER _____

ADVANCING TOOLS:
- ☐ CLAY BITS
- ☐ 6" CONTINUOUS FLIGHT AUGER
- ☐ 8" HOLLOW AUGERS
- ☐ HARD FACED FINGER BITS
- ☐ TUNG.-CARBIDE INSERTS
- ☐ CASING ☐ W/ ADVANCER
- ☐ TRICONE ____/__" STEEL TEETH
- ☐ TRICONE ____" TUNG.-CARB.
- ☐ CORE BIT
- ☐ OTHER _____

HAMMER TYPE:
- ☐ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -H_____

HAND TOOLS:
- ☐ POST HOLE DIGGER
- ■ HAND AUGER
- ■ SOUNDING ROD
- ■ VANE SHEAR TEST
- ☐ OTHER _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V. SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: _____

ELEVATION: _____

NOTES:

—⊥— - BOUNDARY OF ALLUVIAL SOILS

REVISED 09/15/00

9-6-02

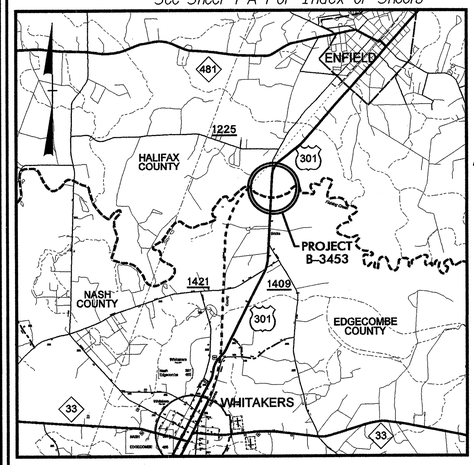
BYRD

09/08/99

B-3453

PROJECT: 8.1301801

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

EDGECOMBE & HALIFAX COUNTIES

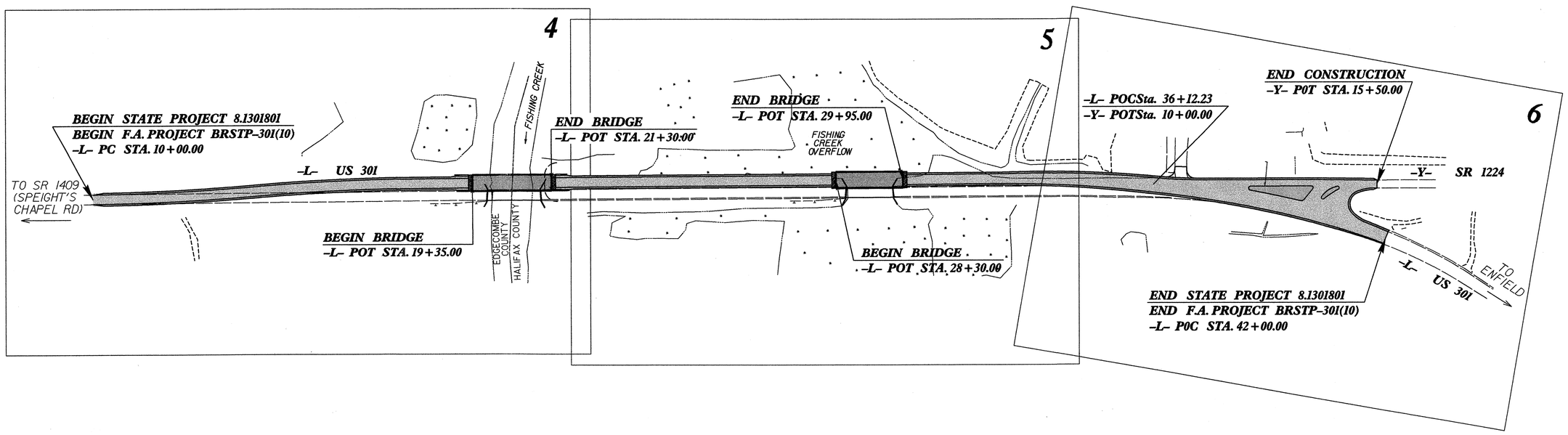
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	8.1301801	3	17

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
8.1301801	BRSTP-301(10)	PE

LOCATION: BRIDGE NO. 23 OVER FISHING CREEK AND BRIDGE NO. 17 OVER FISHING CREEK OVERFLOW ON US 301

TYPE OF WORK: GRADING, DRAINAGE, STRUCTURES, PAVING, AND GUARDRAIL

NAD 83



NCDOT CONTACT:
SCOTT D. BLEVINS, PE
PROJECT ENGINEER
DESIGN SERVICES UNIT

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ____.

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 7020
ADT 2023 = 14,180
DHV = 10 %
D = 60 %
T = 13 % *
V = 60 MPH

* TTST 9 % DUAL 4 %

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT B-3453 = 0.538 mi
LENGTH OF STRUCTURES PROJECT B-3453 = 0.068 mi
TOTAL LENGTH OF STATE PROJECT B-3453 = 0.606 mi

Prepared for:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., NC, 27610
Prepared by:
MA ENGINEERING CONSULTANTS, INC.
598 E. CHATHAM STREET, SUITE 137
CARY, NORTH CAROLINA 27511
(919) 297-0220

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

R.W. PORTER JR., PE
PROJECT ENGINEER

KEVIN S. HUTCHENS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

05 SEP 2002
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PROJECT REFERENCE NUMBER	SHEET NO.	TOTAL SHEETS
	3A	17
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY, GOVERNOR — P.O. BOX 25201, RALEIGH, N.C. 27611-5201 — LYNDO TIPPETT, SECRETARY

April 8, 2003

STATE PROJECT: 8.1301801 B-3453
FEDERAL PROJECT: BRSTP-301(10)
COUNTY: Edgecombe / Halifax

DESCRIPTION: Bridge No. 23 over Fishing Creek and Bridge No. 17 over Fishing Creek Overflow on US 301; Approaches

SUBJECT: Geotechnical Report – Inventory

Project Description

The proposed project is located two miles south of Enfield on US 301 and primarily consists of the relocation of US 301 for constructing the approaches to Fishing Creek and Fishing Creek overflow. Based on the current plans, the project will primarily consist of shifting the alignment 30+/- feet to the west of the existing roadway. No significant embankment will be constructed along the east side of the existing roadway. Existing US 301 will be used as an on-site detour until construction is complete.

The following base lines were investigated for this project:

Line	Station
-L-	10+00 to 42+00
-Y-	10+00 to 15+50

Areas of Special Geotechnical Interest

1) The majority of the project is underlain by silt and clay soils that have a relatively high percent passing the #200 sieve with high moisture contents and have the potential to cause subgrade problems.

2) Typically, the entire project was found to exhibit high water levels, seasonal high ground water, or the potential for ground water related construction problems.

Physiography, Geology, and Ground Water

The project is located within the upper Coastal Plain Physiographic Province and primarily within the boundaries of the Fishing Creek flood plain. Geology of the area basically consists of Recent alluvium underlain by Pliocene age sediments. Topography along the project is relatively flat, with poor surface drainage. Ground elevations along the project range from 71 to 100 feet above sea level along natural ground and 95 to 100 feet along existing US 301.

Drainage along the project is confined to the flood plain of Fishing Creek of the Tar-Pamlico River Basin. The flood plain of Fishing Creek is 2225± feet wide, extending 695± feet to the south and 1430± feet to the north of Fishing Creek. In several locations, surface water is ponded including an area from –L- 23+50 to 26+10 that was previously excavated.

Subsurface conditions along the project create a perched water table. The water is perched on hard coastal plain clay and is held at elevations higher than the water level of Fishing Creek. These conditions cause high ground water levels throughout the majority of the project.

Soils

Artificial fill, roadway embankment, alluvium, and Coastal Plain soils are present on the project. These soils are predominately medium stiff sandy silt (A-4) and sandy clay (A-6), with some beds of silty sand (A-1-a, A-2-4) and fine to coarse sand (A-3).

Alluvial soils associated with Fishing Creek underlie a majority of the project, noted primarily from -L- station 12+70 to 35+10±. The approximate limits of the alluvial boundaries are shown on the accompanying plan view sheets. Very soft to stiff sandy silt (A-4) and sandy clay (A-6) characterize the majority of the alluvium. All alluvium sampled is composed of at least 50% material passing sieve #200. Vane Shear Test data show shear strength values ranging from 125 psf to 2172 psf. Some of the sediments have the potential for subgrade failure due to the relatively poor engineering properties. Fabric for soil stabilization and/or undercutting of the alluvial soils may be required to provide a suitable base for embankment along the new alignment. Very little organic material was noted along the project.

Soils of the Yorktown Formation consist of medium dense fine to coarse sand (A-3) and sandy silt (A-4). These units comprise the surficial soils of the upland areas form station 10+00 to 12+70 and from station 35+10 to 42+00. Typically, the upland sands occur at the beginning of the project and have good to fair engineering properties. Upland silts comprise the surficial deposits from -L- station 35+10 to 42+00 and along the entire length of -Y- and exhibit poor engineering characteristics at the surface where high ground water and surface water is present.

Artificial fill consisting of up to 3± feet of medium dense sand and gravelly sand (A-2-4, A-1-a) is located within the project limits to the left of proposed -L- from station 32+75 to 33+40. From station 33+40 to 36+50, artificial fill consists of medium stiff sandy silt (A-4). The artificial fill was used to create a lumber yard and parking area, and was also used as backfill during the construction of a septic field. Roadway embankment constructed for US 301 exists along the entire project, primarily to the right of the proposed -L-. From station 10+00 to 28+50, the embankment consists primarily of 3 to 12 feet of medium stiff sandy clay (A-6). From station 28+50 to the end of the project, the embankment is comprised of 3 to 12 feet of medium dense silty sand (A-2-4) and gravelly sand (A-1-a).

Respectfully submitted,

John R. McCray

John R. McCray,
Project Geologist

PROJECT REFERENCE NUMBER	SHEET NO.	TOTAL SHEETS
	3B	17

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION

PROJECT: B-3453 38073.3.1 COUNTY: EDGECOMBE & HALIFAX DATE: December 7, 2004 COMPUTED BY: RWP SHEET: 1 OF 1

STATION to STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +30%		ROCK	SUITABLE	UNSUITABLE	TOTAL
PHASE I (LEFT SIDE)														
-L- 10+00.00 TO 19+50.00	117				117	8565		8565	11135	11018				0
-L- 21+13.00 TO 28+50.00	0				0	13571		13571	17642	17642				0
-L- 29+84.00 TO 42+00.00	252		3500		252	9804		9804	12745	12493			3500	3500
-DRIVE- 10+50.00 TO 11+750.00	40				40	26		26	34			6		6
					0									
PHASE I SUBTOTAL	409		3500		409	31966		31966	41556	41153		6	3500	3506
ESTIMATED SHOULDER MATERIAL						630		630	819	819				
ESTIMATED UNDERCUT (CONTINGENCY)			500			500		500	650	650			500	500
WASTE TO REPLACE BORROW										-6		-6		-6
PHASE I TOTAL	409		4000		409	33096		33096	43025	42616		0	4000	4000
PHASE II (RIGHT SIDE)														
-L- 10+00.00 TO 19+50.00	408				408	665		665	865	457				0
-L- 21+13.00 TO 28+50.00	297				297	274		274	356	59				0
-L- 29+84.00 TO 42+00.00	955				955	20		20	26			929		929
PHASE II SUBTOTAL	1660				1660	959		959	1247	516		929		929
ESTIMATED SHOULDER MATERIAL						623		623	810	810				
WASTE TO REPLACE BORROW										-929		-929		-929
PHASE II TOTAL	1660				1660	1582		1582	2057	397		0		0
PROJECT SUBTOTAL (PHASE I+II)	2069		4000		2069	34678		34678	45082	43013			4000	4000
SELECT MATERIAL TO REPLACE BORROW										-13400				
PROJECT TOTAL	2069		4000		2069	34678		34678	45082	29613			4000	4000
ESTIMATE 5% TO REPLACE TOPSOIL ON BORROW PIT										1481				
GRAND TOTAL (CUBIC YARDS)	2069		4000		2069	34678		34678	45082	31094			4000	4000
SAY (CUBIC YARDS)	2,100									31100				

-L- PAVEMENT STRUCTURE VOLUME = 505 CY
SELECT MATERIAL = 3,000 CY (CLASS II or III) (USE WITH FABRIC STABILIZATION)
SELECT MATERIAL = 10,400 CY (CLASS III) (USE AS BACKFILL FOR UNDERCUT or BELOW WATER SURFACE)
ROCK EMBANKMENT (CLASS II RIP RAP) = 2300 TONS

8/17/99

REVISIONS

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B4134-1" WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING: 874849.507(ft) EASTING: 2446551.521(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999999848
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B4134-1" TO -L- STATION 10+00.00 IS
N 89° 30' 27.0" W 60.679.515 FEET
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

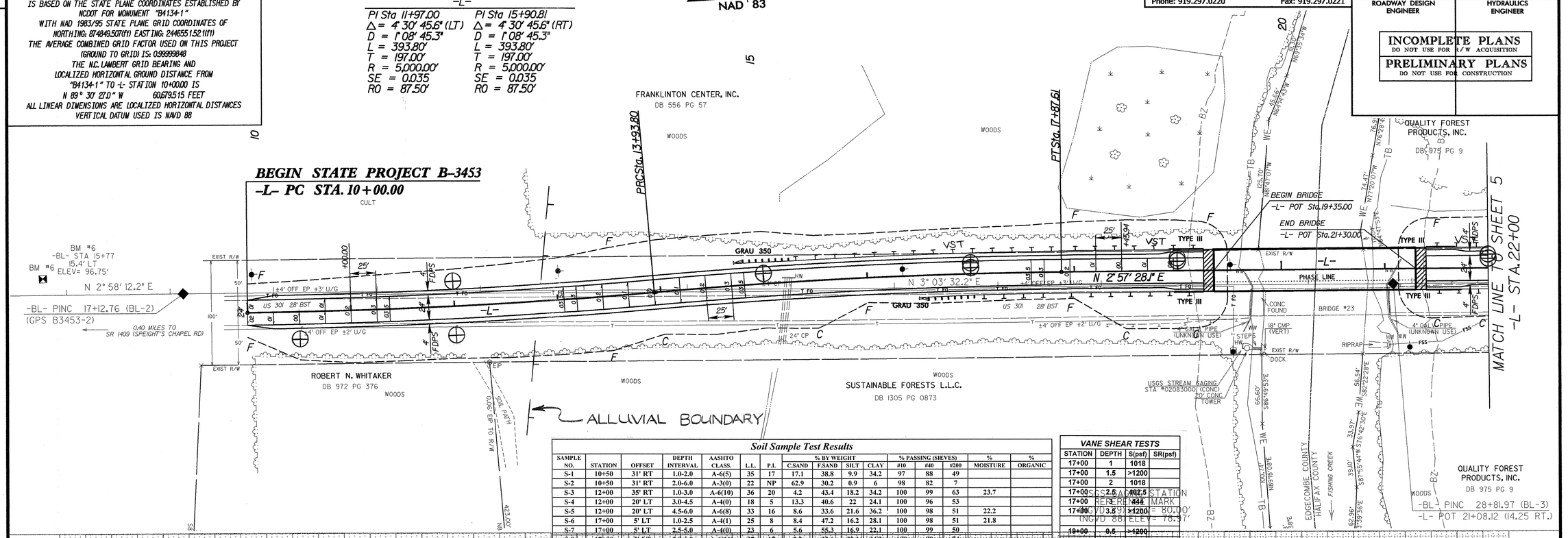
PROJECT REFERENCE NO.	SHEET NO.
B-3453	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

PI Sta 11+97.00	PI Sta 15+90.81
Δ = 4° 30' 45.6" (LT)	Δ = 4° 30' 45.6" (RT)
D = 1° 08' 45.3"	D = 1° 08' 45.3"
L = 393.80'	L = 393.80'
T = 197.00'	T = 197.00'
R = 5,000.00'	R = 5,000.00'
SE = 0.035	SE = 0.035
RO = 87.50'	RO = 87.50'

NAD 83



Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-1	10+50	31' RT	1.0-2.0	A-6(5)	35	17	17.1	38.8	9.9	34.2	97	88	49		
S-2	10+50	31' RT	2.0-6.0	A-3(0)	22	NP	62.9	30.2	0.9	6	98	82	7		
S-3	12+00	35' RT	1.0-3.0	A-6(10)	36	20	4.2	43.4	18.2	34.2	100	99	63	23.7	
S-4	12+00	20' LT	3.0-4.5	A-4(0)	18	5	13.3	40.6	22	24.1	100	96	53		
S-5	12+00	20' LT	4.5-6.0	A-6(8)	33	16	8.6	33.6	21.6	36.2	100	98	51	22.2	
S-6	17+00	5' LT	1.0-2.5	A-4(1)	25	8	8.4	47.2	16.2	28.1	100	98	51	21.8	
S-7	17+00	5' LT	2.5-5.0	A-4(0)	23	6	5.6	55.3	16.9	22.1	100	99	50		
S-8	17+00	5' LT	5.0-6.0	A-6(11)	37	17	2.2	33.6	30.1	34.2	100	99	74		
S-9	22+00	9' LT	1.0-2.5	A-6(13)	37	16	3.8	24.5	39.6	32.1	100	98	82		
S-10	22+00	9' LT	2.5-4.0	A-4(3)	26	7	1	52.2	26.6	20.1	100	100	66		
S-11	22+00	9' LT	4.0-5.5	A-4(3)	7	2	0.8	43.8	33.3	22.1	100	100	72		
S-12	22+00	9' LT	5.5-6.0	A-4(5)	29	9	2	40.8	33.1	24.1	100	99	74		

VANE SHEAR TESTS

STATION	DEPTH	S(psf)	SR(psf)
17+00	1	1018	
17+00	1.5	>1200	
17+00	2	1018	
17+00	2.5	>1200	
17+00	3	444	
17+00	3.5	>1200	
19+00	0.5	>1200	
19+00	1	1166	
19+00	1.5	407	
19+00	1.7	>1200	
22+00	0.5	740	
22+00	1	1110	
22+00	1.5	1110	
22+00	2	>1200	

SGS 2.8 ABOVE STATION REFERENCE MARK = 80.00' (NGVD 88) ELEV = 78.97'

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. -

DRAINAGE AREA	= 34.4	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 26.00	CFS
DESIGN HW ELEVATION	= 86.0	FT
100 YEAR DISCHARGE	= 31.50	CFS
100 YEAR HW ELEVATION	= 86.3	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 106.00	CFS
OVERTOPPING ELEVATION	= 95.6	FT

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 17000	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 94.4	FT
BASE DISCHARGE	= 20700	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 95.9	FT
OVERTOPPING DISCHARGE	= 22000	CFS
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING ELEVATION	= 96.2	FT
	=	FT
DATE OF SURVEY	= 09/2002	
W.S. ELEVATION AT DATE OF SURVEY	= 76.9	FT

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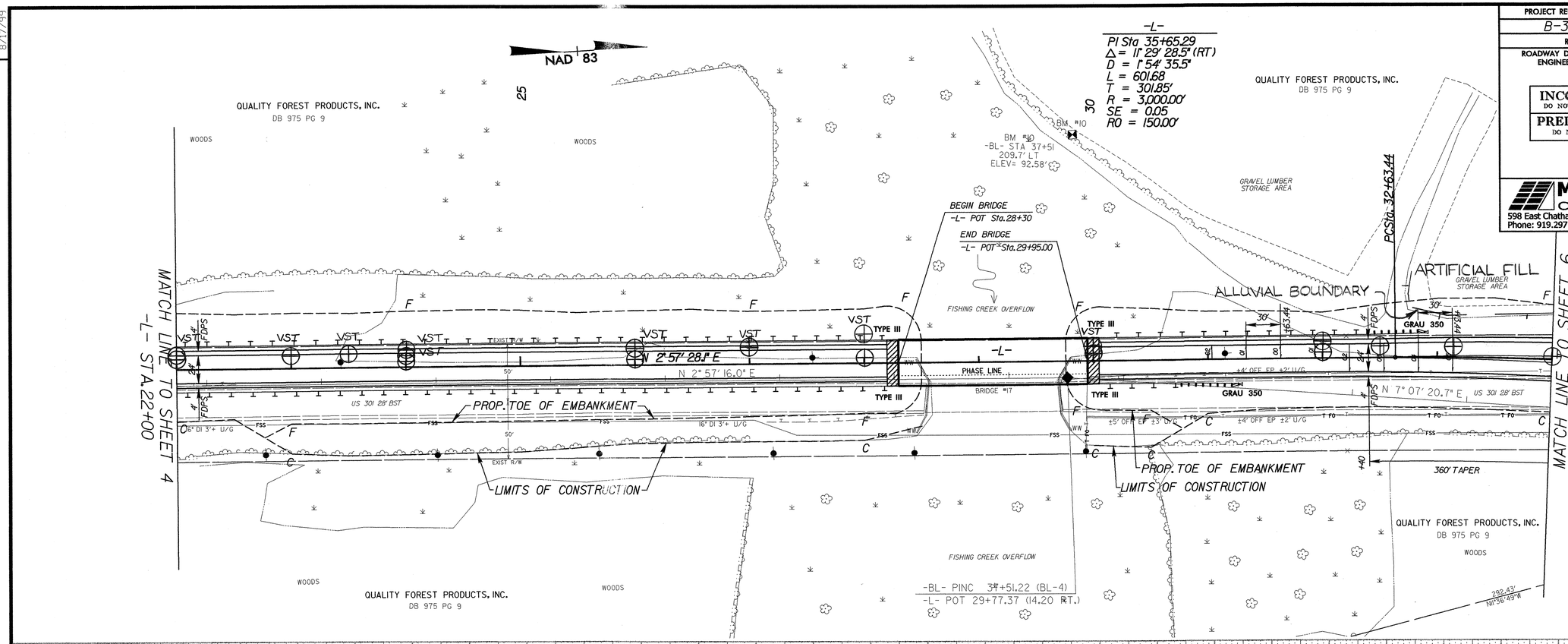
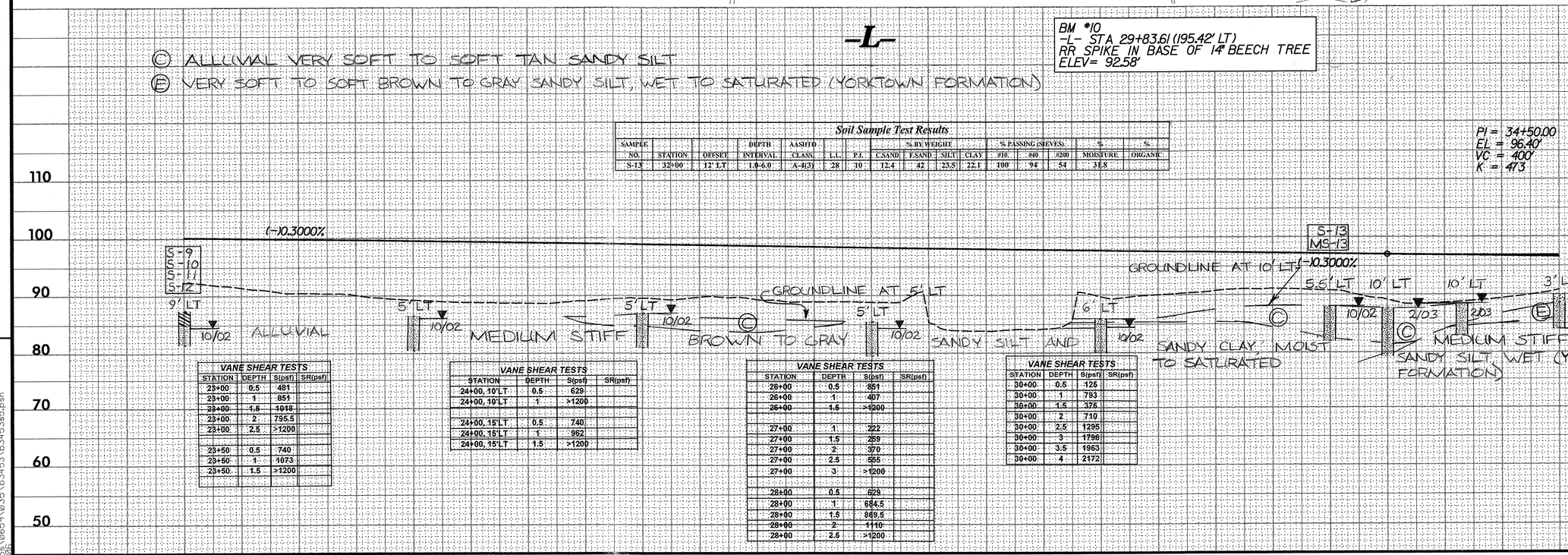
PROJECT REFERENCE NO.	SHEET NO.
B-3453	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221





Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT CSAND	FSAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-13	32+00	12' LT	1.0-6.0	A-4(3)	28	10	12.4	42	23.5	22.1	100	94	54	31.8	

VANE SHEAR TESTS

STATION	DEPTH	S(psf)	SR(psf)
23+00	0.5	481	
23+00	1	851	
23+00	1.5	1018	
23+00	2	795.5	
23+00	2.5	>1200	
23+50	0.5	740	
23+50	1	1073	
23+50	1.5	>1200	

VANE SHEAR TESTS

STATION	DEPTH	S(psf)	SR(psf)
24+00, 10'LT	0.5	629	
24+00, 10'LT	1	>1200	
24+00, 15'LT	0.5	740	
24+00, 15'LT	1	962	
24+00, 15'LT	1.5	>1200	

VANE SHEAR TESTS

STATION	DEPTH	S(psf)	SR(psf)
26+00	0.5	851	
26+00	1	407	
26+00	1.5	>1200	
27+00	1	222	
27+00	1.5	259	
27+00	2	370	
27+00	2.5	555	
27+00	3	>1200	
28+00	0.5	629	
28+00	1	684.5	
28+00	1.5	869.5	
28+00	2	1110	
28+00	2.5	>1200	

VANE SHEAR TESTS

STATION	DEPTH	S(psf)	SR(psf)
30+00	0.5	125	
30+00	1	793	
30+00	1.5	376	
30+00	2	710	
30+00	2.5	1295	
30+00	3	1796	
30+00	3.5	1963	
30+00	4	2172	

REVISIONS

8/17/99

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8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-3453	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

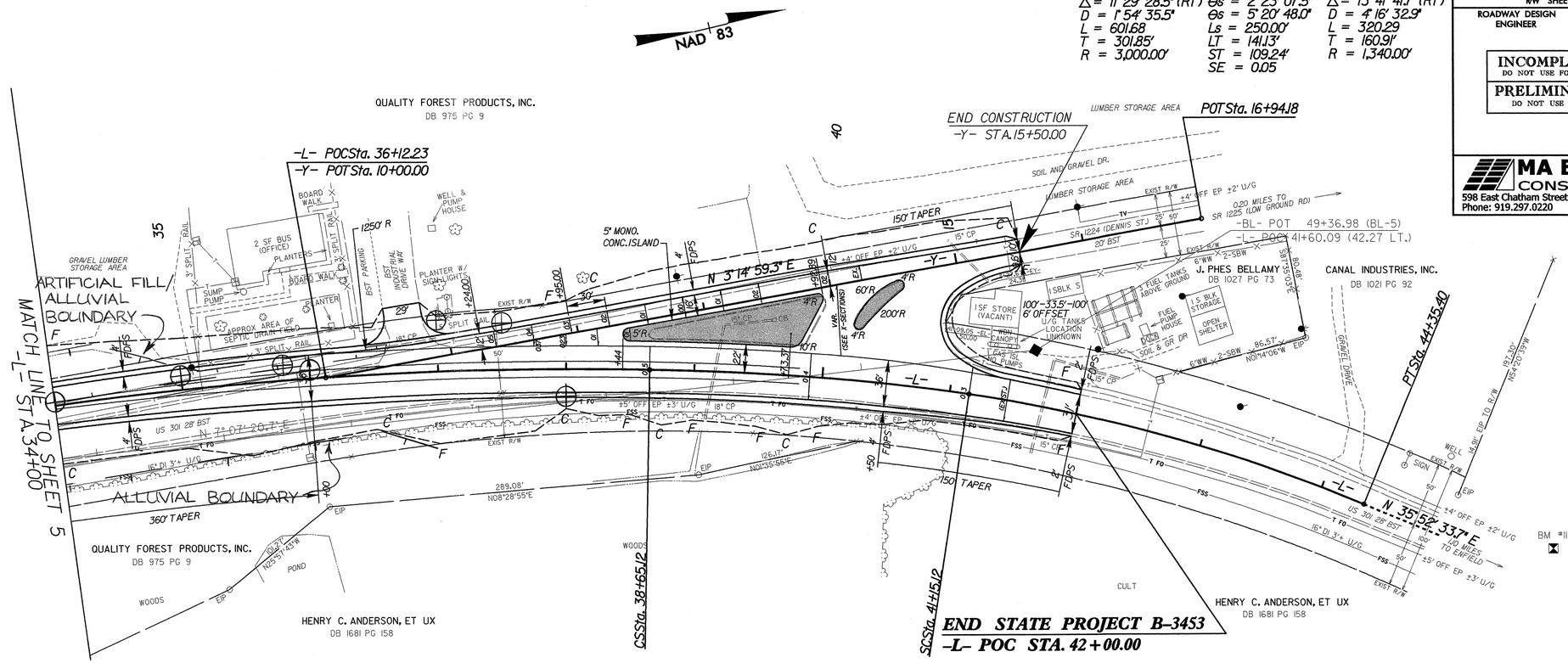
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

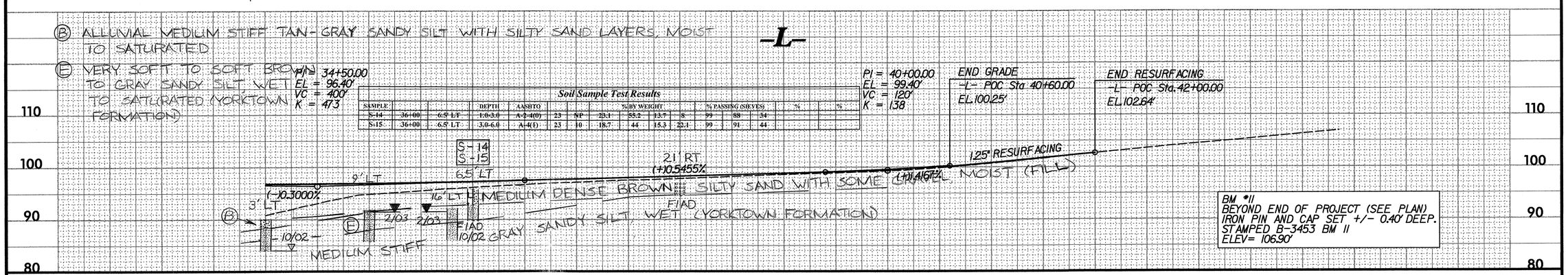
-L-

PI Sta 35+65.29	PIs Sta 40+06.24	PI Sta 42+76.03
Δ = 11° 29' 28.5" (RT)	Θs = 2° 23' 07.5"	Δ = 13° 41' 41.7" (RT)
D = 1° 54' 35.5"	Θs = 5° 20' 48.0"	D = 4° 16' 32.9"
L = 601.68	Ls = 250.00'	L = 320.29
T = 301.85'	LT = 141.13'	T = 160.91'
R = 3,000.00'	ST = 109.24'	R = 1,340.00'
	SE = 0.05	



Ⓑ ALLUVIAL MEDIUM STIFF TAN-GRAY SANDY SILT WITH SILTY SAND LAYERS, MOIST TO SATURATED

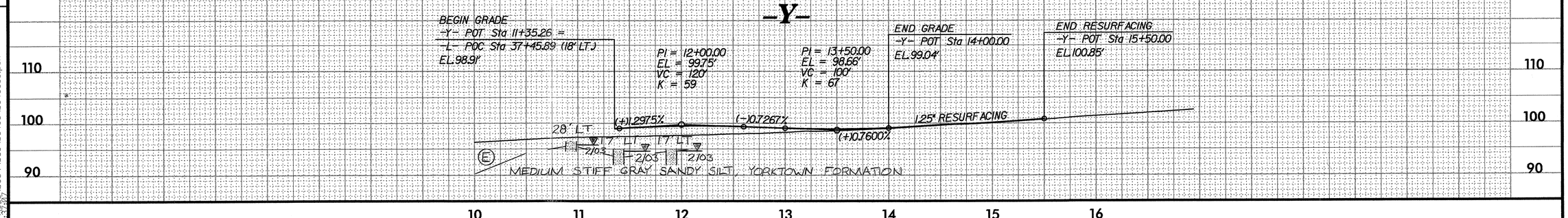
Ⓔ VERY SOFT TO SOFT BROWN TO GRAY SANDY SILT WET TO SATURATED (YORKTOWN FORMATION)



Soil Sample Test Results

SAMPLE				DEPTH	AASHTO	% BY WEIGHT					% PASSING (SIEVES)			%		%
S-14	36+00	6.5' LT		1.0-3.0	A-2-4(0)	23	NP	23.1	55.2	13.7	8	99	88	34		
S-15	36+00	6.5' LT		3.0-6.0	A-4(1)	23	10	18.7	44	15.3	22.1	99	91	44		

-Y-



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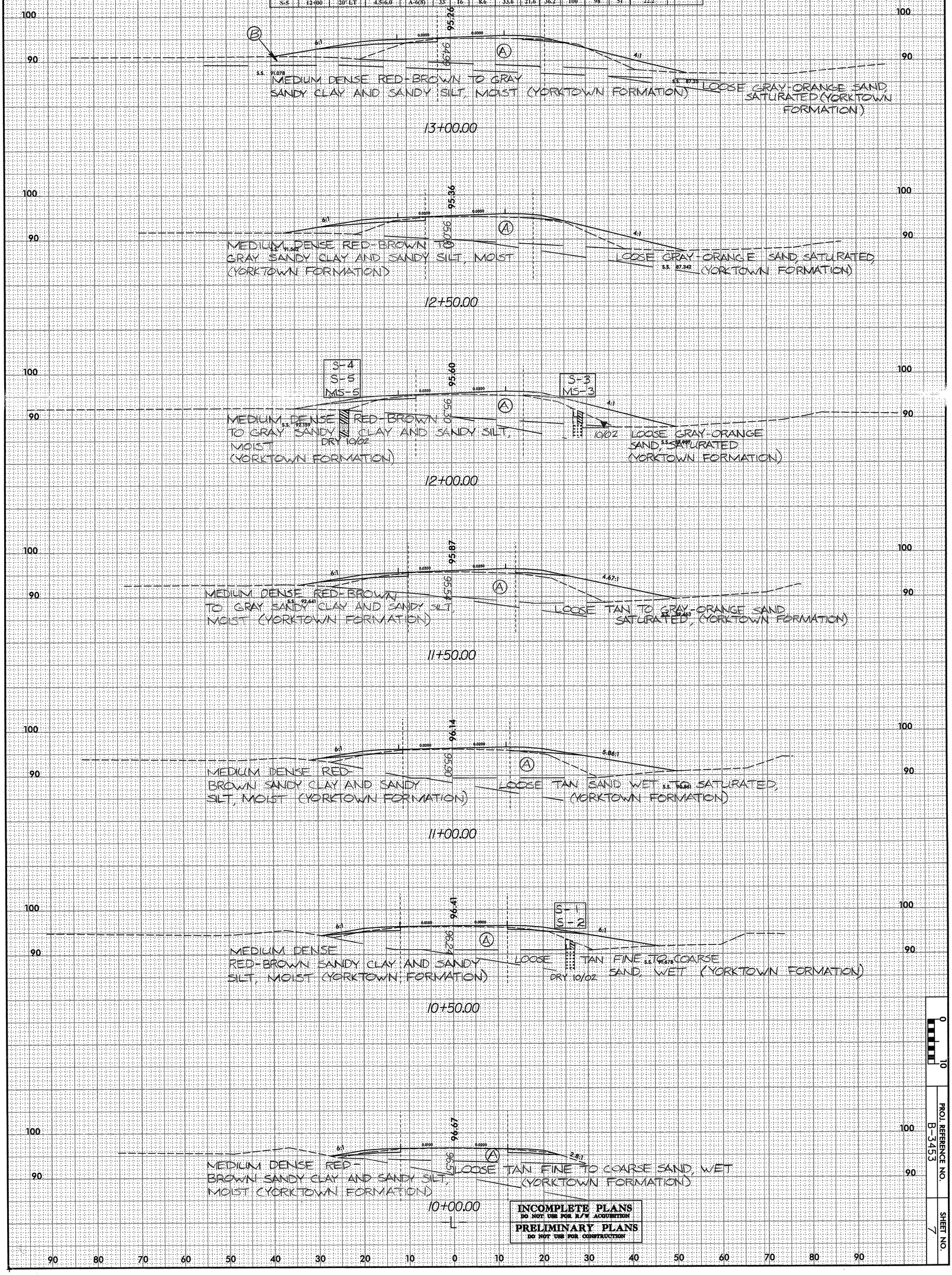
Ⓐ ROADWAY EMBANKMENT MEDIUM DENSE RED-BROWN SANDY CLAY, MOIST
Ⓑ ALLUVIAL MEDIUM STIFF TO STIFF TAN-GRAY SANDY CLAY, WET

Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-1	10+50	31' RT	1.0-2.0	A-6(5)	35	17	17.1	38.8	9.9	34.2	97	88	49		
S-2	10+50	31' RT	2.0-6.0	A-3(0)	22	NP	62.9	30.2	0.9	6	98	82	7		
S-3	12+00	35' RT	1.0-3.0	A-6(10)	36	20	4.2	43.4	18.2	34.2	100	99	63	23.7	
S-4	12+00	20' LT	3.0-4.5	A-4(0)	18	5	13.3	40.6	22	24.1	100	96	53		
S-5	12+00	20' LT	4.5-6.0	A-6(8)	33	16	8.6	33.6	21.6	36.2	100	98	51	22.2	



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

0 10

PROJ. REFERENCE NO. B-3453

SHEET NO. 7

05 SEP 2002
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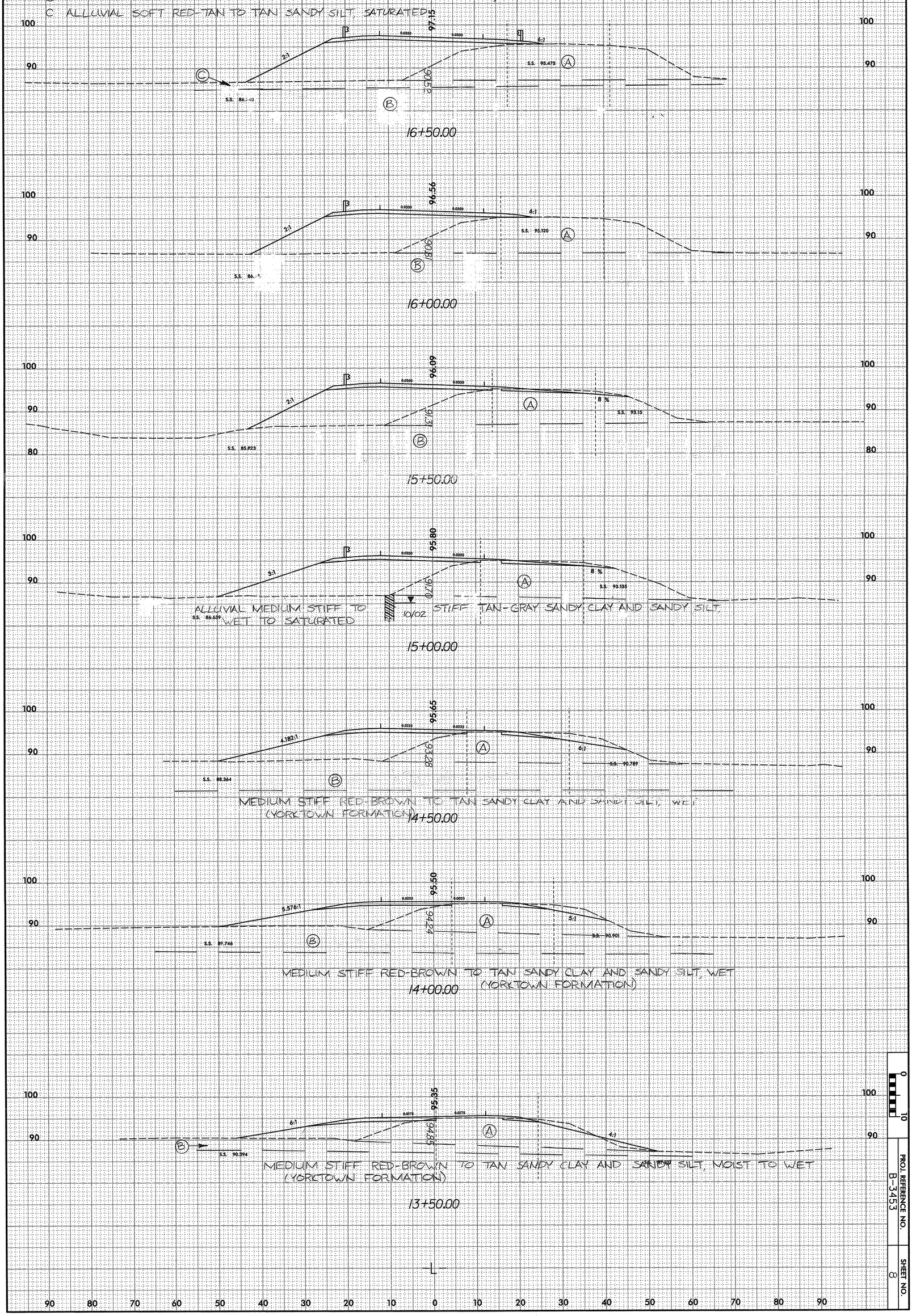
Rev 12/12/00

Ⓐ ROADWAY EMBANKMENT MEDIUM DENSE RED-BROWN SANDY CLAY MOIST
Ⓑ ALLUVIAL MED STIFF TO STIFF TAN-GRAY SANDY CLAY AND SANDY SILT, WET TO SATURATED
C ALLUVIAL SOFT RED-TAN TO TAN SANDY SILT SATURATED



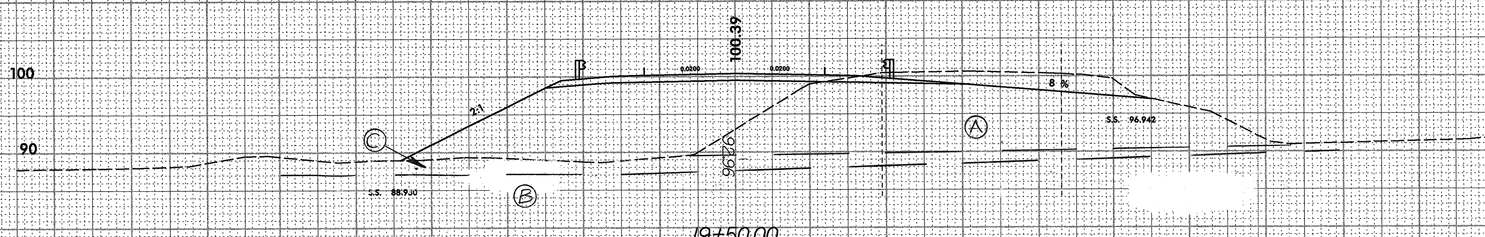
PROJ. REFERENCE NO. B-3453

SHEET NO. 8

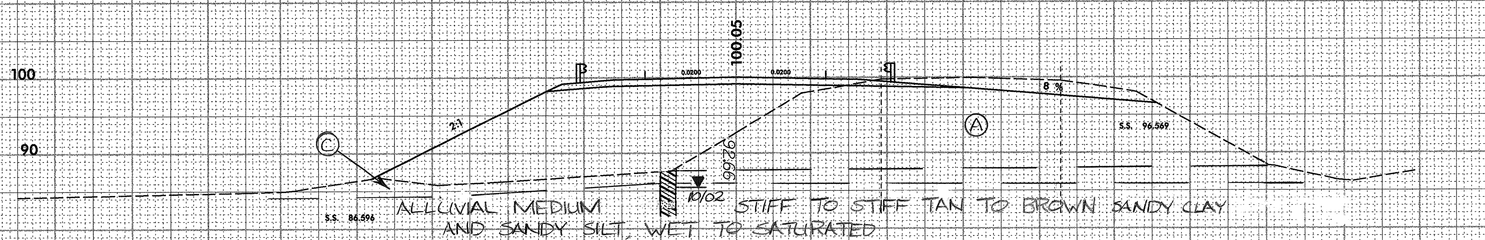
Ⓐ ROADWAY EMBANKMENT MEDIUM STIFF RED-BROWN SANDY CLAY, MOIST
Ⓑ ALLUVIAL MEDIUM STIFF TO STIFF BROWN TO GRAY-ORANGE SANDY CLAY AND SANDY SILT, WET TO SATURATED
Ⓒ ALLUVIAL SOFT RED-TAN TO TAN-BROWN SANDY CLAY AND SANDY SILT, WET TO SATURATED

Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.L.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-6	17+00	5' LT	1.0-2.5	A-4(1)	25	8	8.4	47.2	16.2	28.1	100	98	51	21.8	
S-7	17+00	5' LT	2.5-5.0	A-4(0)	23	6	5.6	55.3	16.9	22.1	100	99	50		
S-8	17+00	5' LT	5.0-6.0	A-6(11)	37	17	2.2	33.6	30.1	34.2	100	99	74		

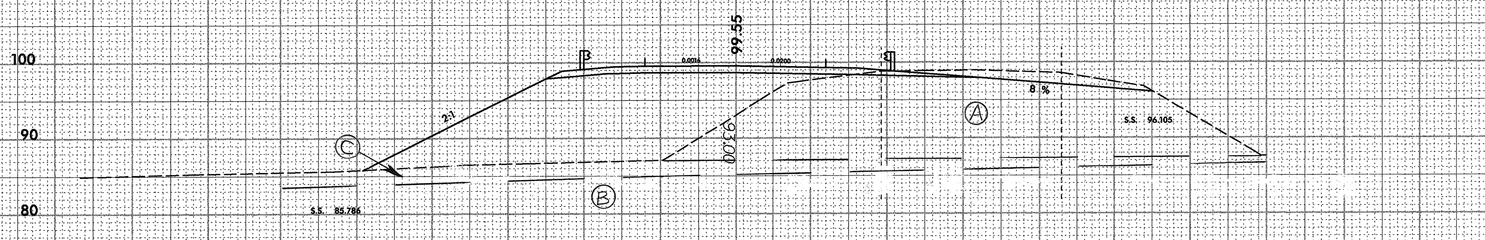


19+50.00



ALLUVIAL MEDIUM STIFF TO STIFF TAN TO BROWN SANDY CLAY AND SANDY SILT, WET TO SATURATED

19+00.00



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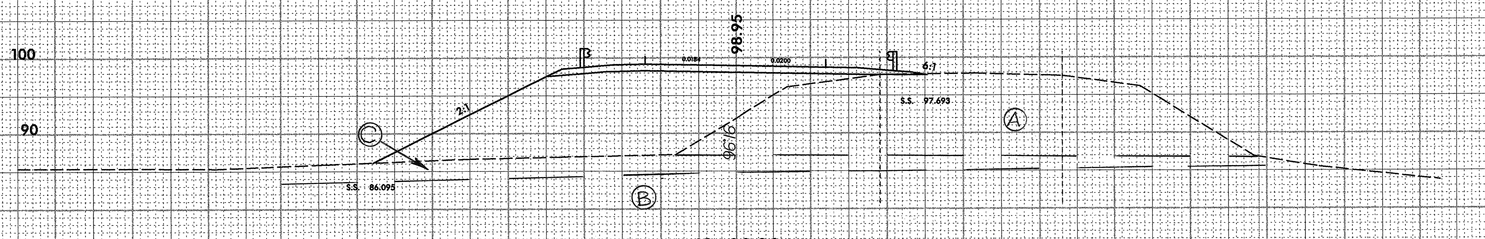

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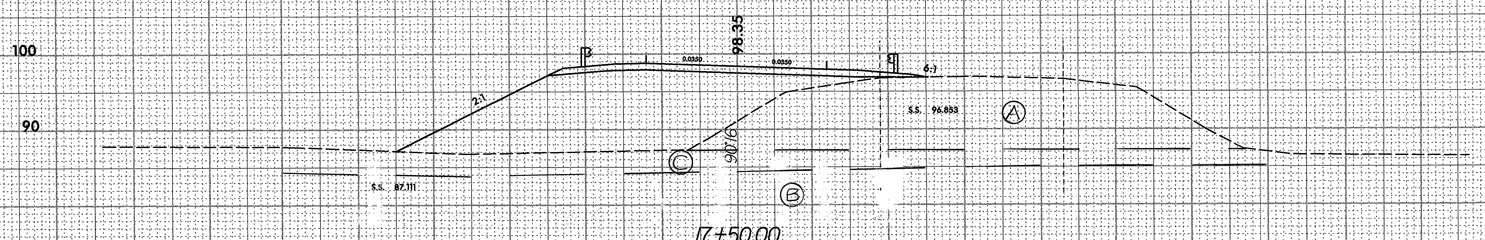

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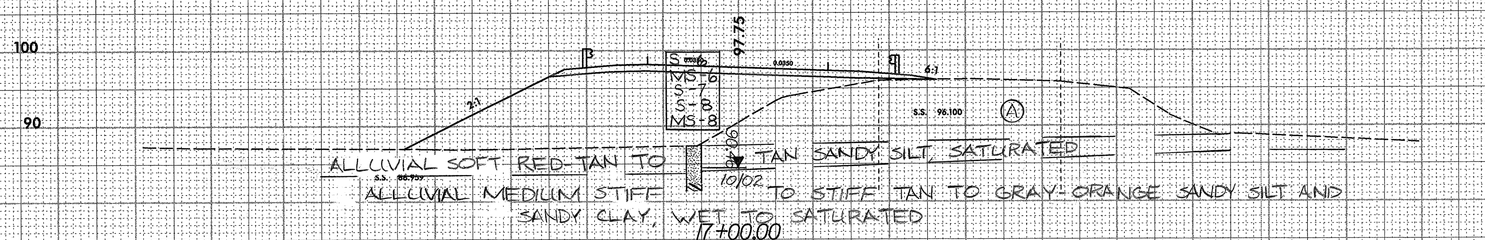

ALLUVIAL SOFT RED-TAN TO TAN SANDY SILT, SATURATED
ALLUVIAL MEDIUM STIFF TO STIFF TAN TO GRAY-ORANGE SANDY SILT AND SANDY CLAY, WET TO SATURATED

17+00.00

PROJ. REFERENCE NO. B-3453

SHEET NO. 9

05 SEP 2002
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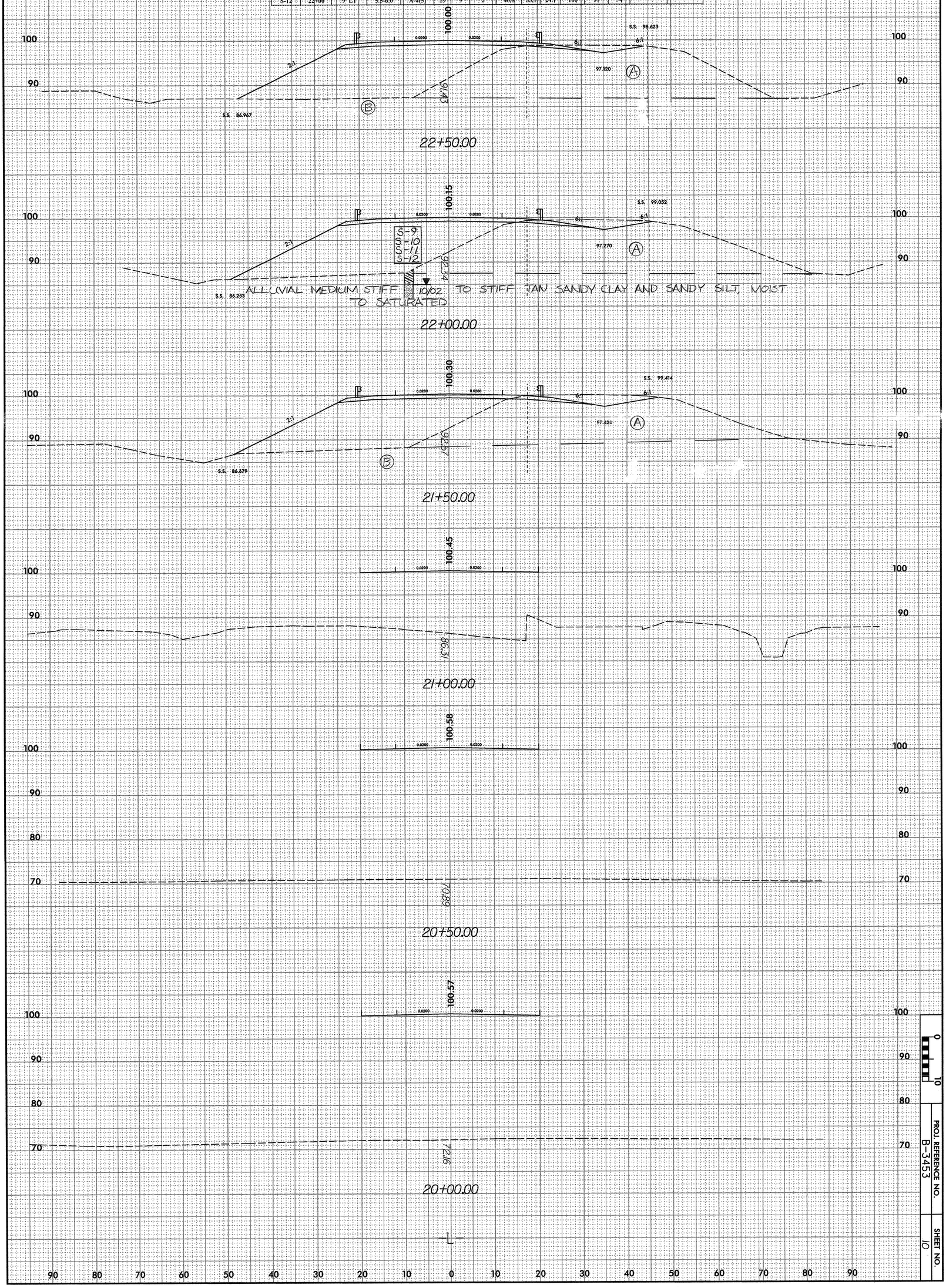
14:32:30

Rev 12/12/00

Ⓐ ROADWAY EMBANKMENT MEDIUM STIFF RED-BROWN SANDY CLAY, MOIST
Ⓑ ALLUVIAL MEDIUM STIFF TO STIFF TAN SANDY CLAY AND SANDY SILT, MOIST TO SATURATED

Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-9	22+00	9' LT	1.0-2.5	A-6(13)	37	16	3.8	24.5	39.6	32.1	100	98	82		
S-10	22+00	9' LT	2.5-4.0	A-4(3)	26	7	1	52.2	26.6	20.1	100	100	66		
S-11	22+00	9' LT	4.0-5.5	A-4(3)	27	7	0.8	43.8	33.3	22.1	100	100	72		
S-12	22+00	9' LT	5.5-6.0	A-4(5)	29	9	2	40.8	33.1	24.1	100	99	74		



PROJ. REFERENCE NO. B-3453

SHEET NO. 10

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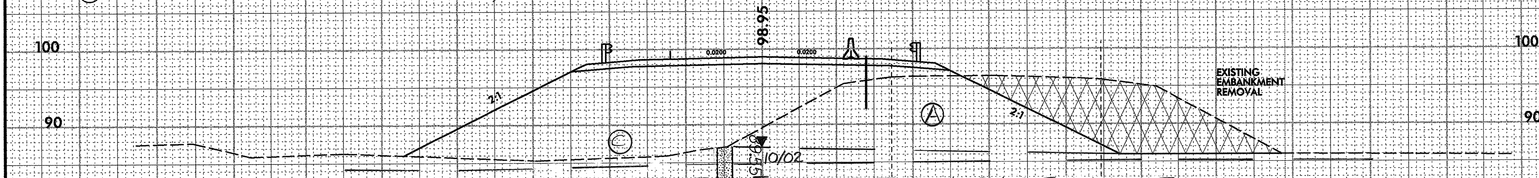
19:32:30

Rev 12/12/00

Ⓐ ROADWAY EMBANKMENT MEDIUM STIFF RED-BROWN SANDY CLAY, MOIST
Ⓑ ALLUVIAL MEDIUM STIFF TO STIFF TAN-GRAY SANDY SILT, MOIST TO SATURATED
Ⓒ ALLUVIAL SOFT TAN SANDY SILT, MOIST TO SATURATED



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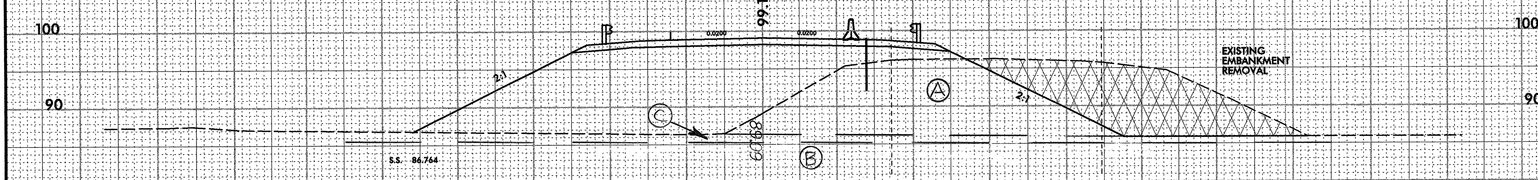

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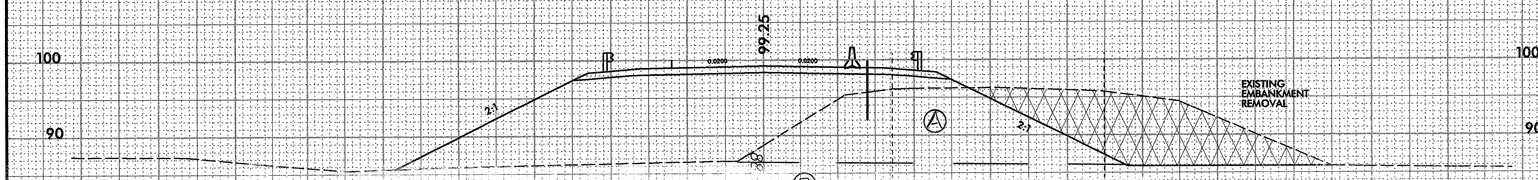

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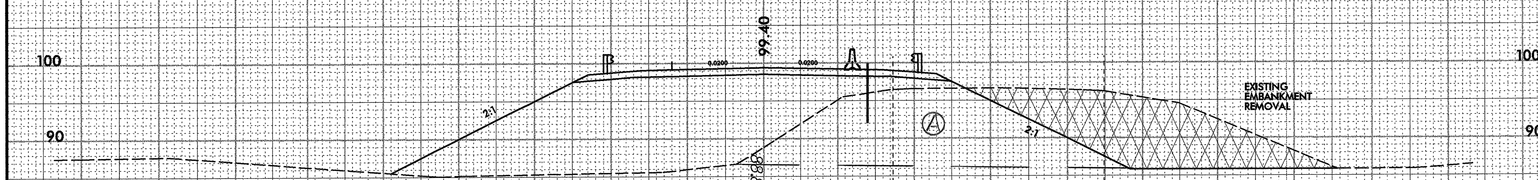

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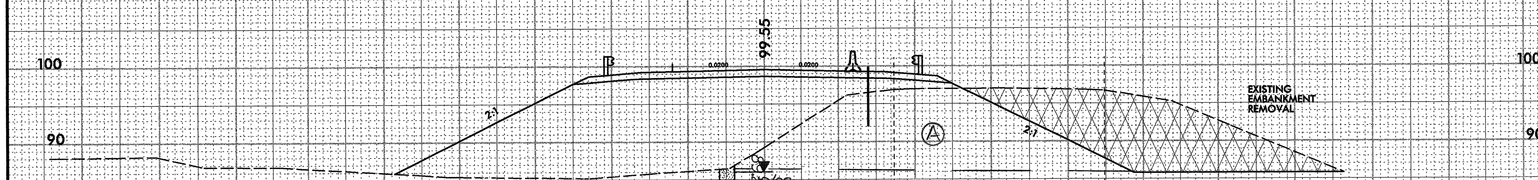

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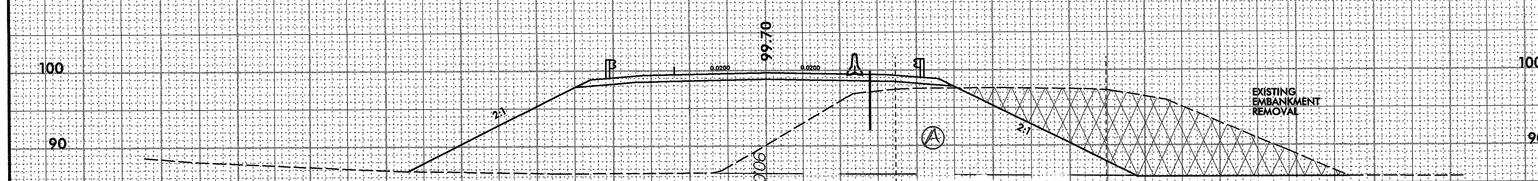

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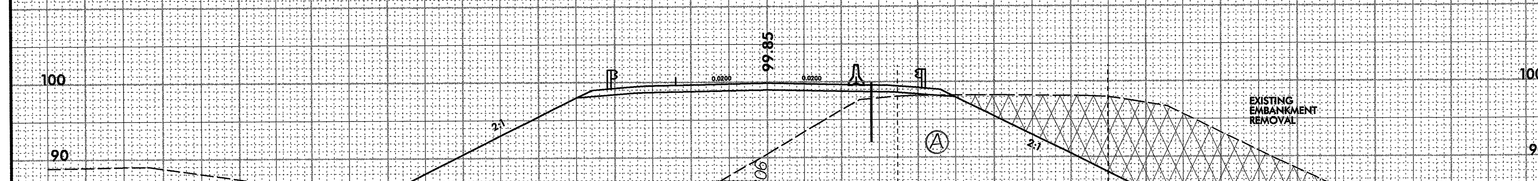

23+00.00

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PROJ. REFERENCE NO. B-3453

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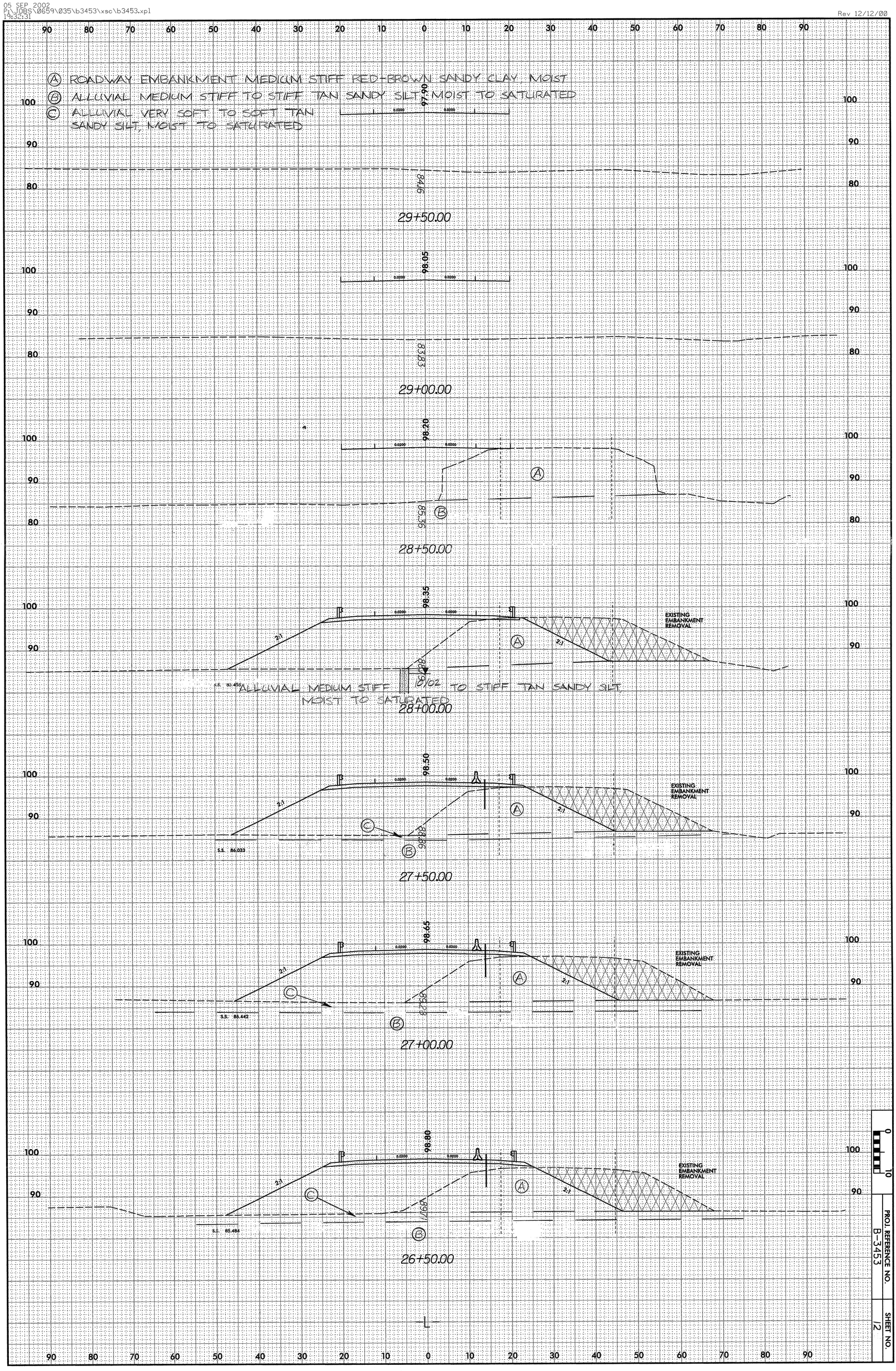
Rev 12/12/00



PROJ. REFERENCE NO. B-3453

SHEET NO. 12

05 SEP 2002
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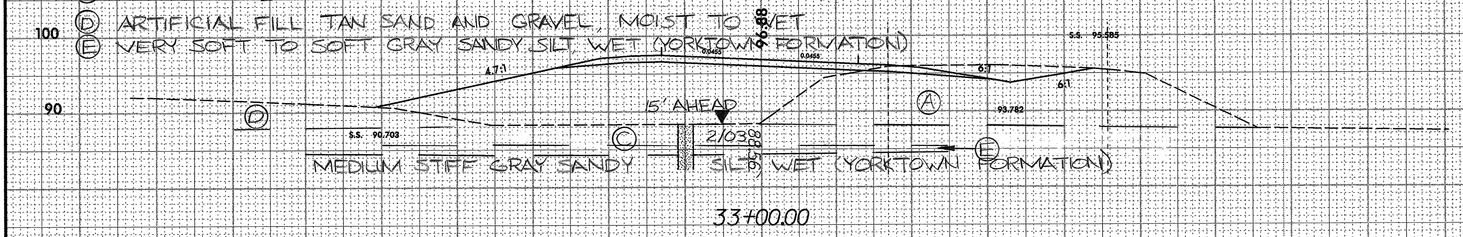
Rev 12/12/00

Ⓐ ROADWAY EMBANKMENT MEDIUM DENSE BROWN SILTY SAND, MOIST
Ⓑ ALLUVIAL MEDIUM STIFF TO STIFF TAN-GRAY SANDY SILT, MOIST TO SATURATED
Ⓒ ALLUVIAL VERY SOFT TO SOFT TAN-GRAY SANDY SILT, MOIST TO WET
Ⓓ ARTIFICIAL FILL TAN SAND AND GRAVEL, MOIST TO WET
Ⓔ VERY SOFT TO SOFT GRAY SANDY SILT, WET (YORKTOWN FORMATION)



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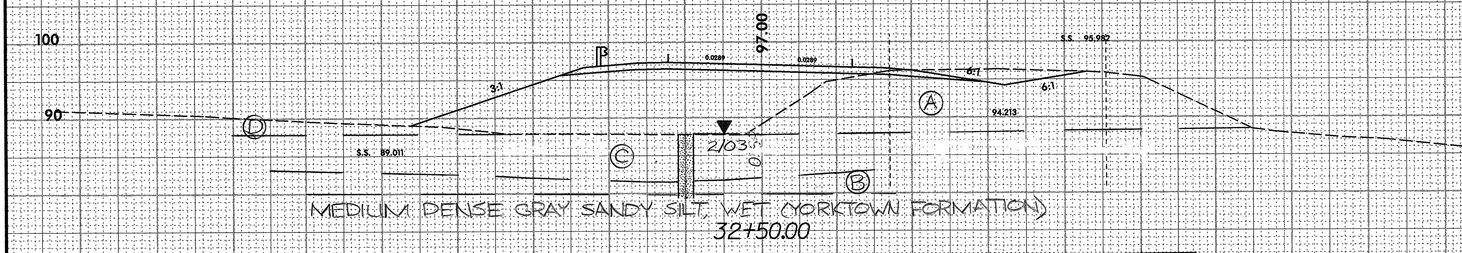
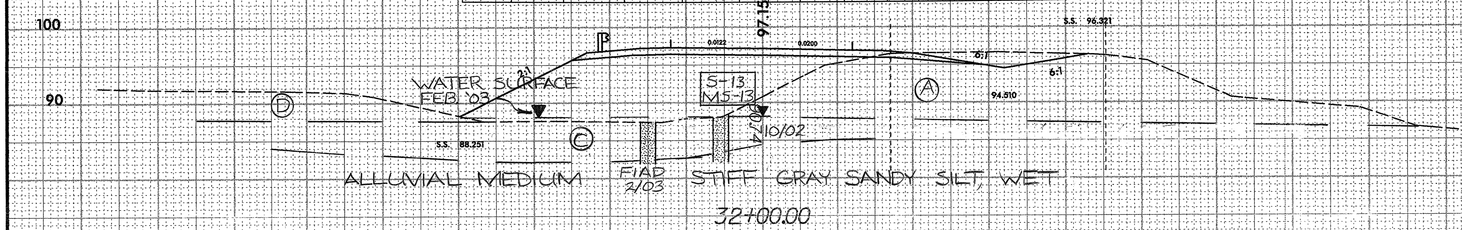


32+50.00

Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-13	32+00	12' LT	1.0-6.0	A-4(3)	28	10	12.4	42	23.5	22.1	100	94	54	31.8	



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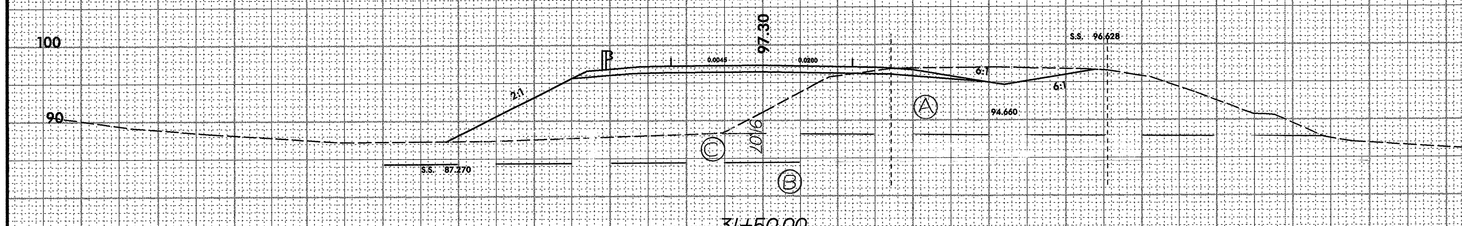
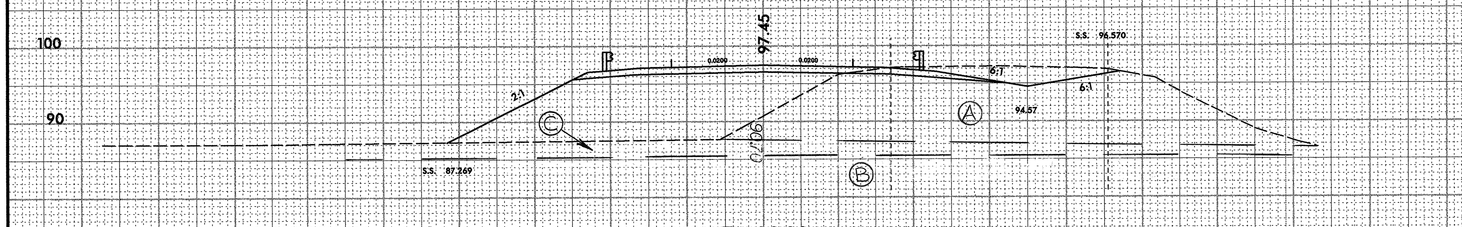


31+50.00



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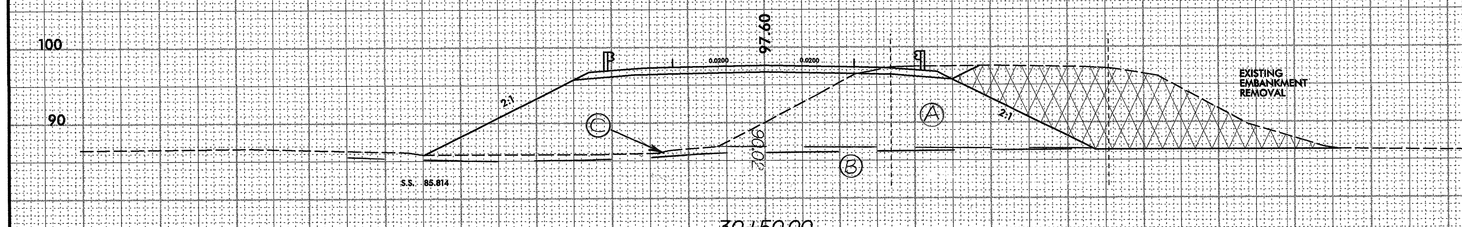
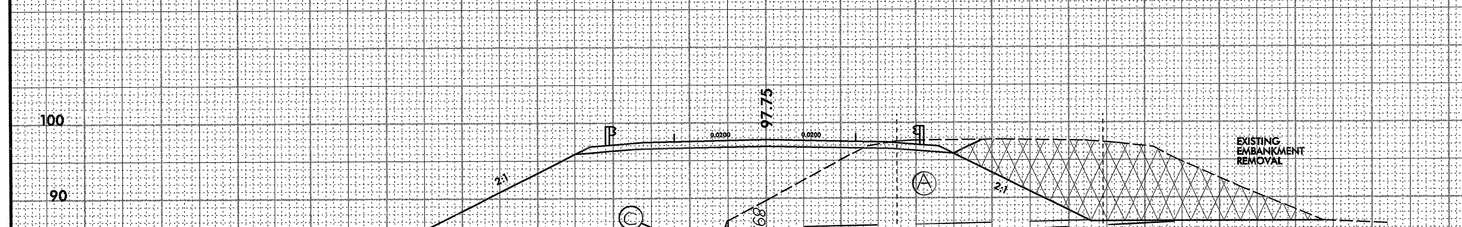


30+50.00



30+00.00

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PROJ. REFERENCE NO. B-3453

SHEET NO. 13

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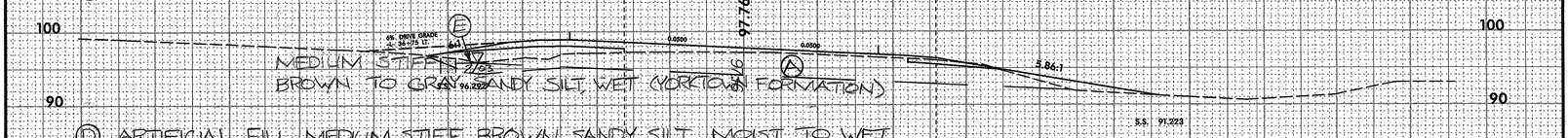
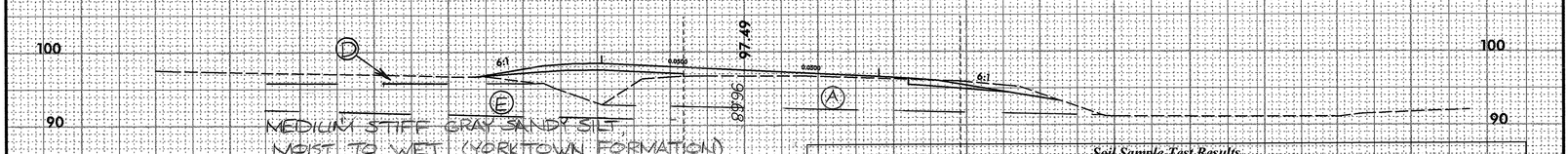
Rev 12/12/00

(A) ROADWAY EMBANKMENT MEDIUM DENSE BROWN SILTY SAND, MOIST
(B) ALLUVIAL MEDIUM STIFF BROWN SANDY SILT WITH SOME SILTY SAND, WET TO SATURATED
(C) ALLUVIAL VERY SOFT TO SOFT BROWN SANDY SILT WITH SILTY SAND LAYERS, WET TO SATURATED



(D) ARTIFICIAL FILL MEDIUM STIFF BROWN SANDY SILT, MOIST TO WET
(E) VERY SOFT TO SOFT BROWN TO GRAY SANDY SILT, WET TO SATURATED

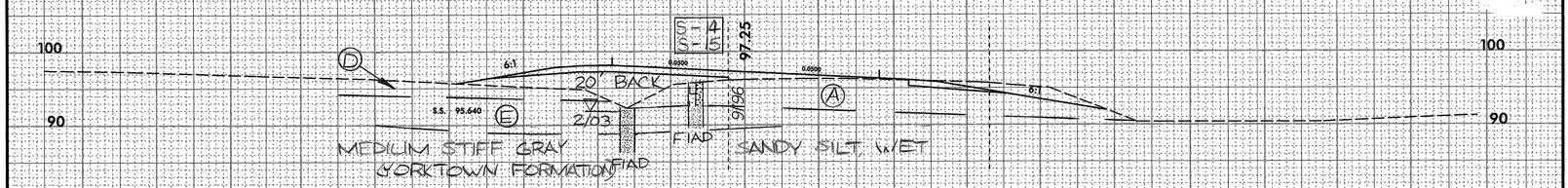
37+00.00



36+50.00

Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-14	36+00	6.5' LT.	1.0-3.0	A-2-4(0)	33	NP	33.1	55.2	13.7	8	99	88	34		
S-15	36+00	6.5' LT.	3.0-6.0	A-4(1)	23	10	18.7	44	15.3	22.1	99	91	44		



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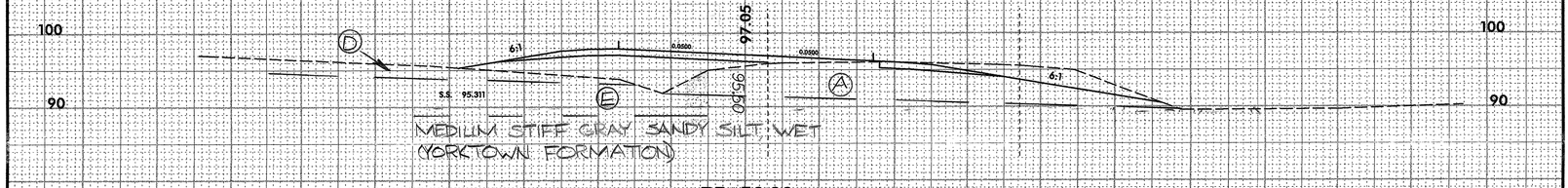

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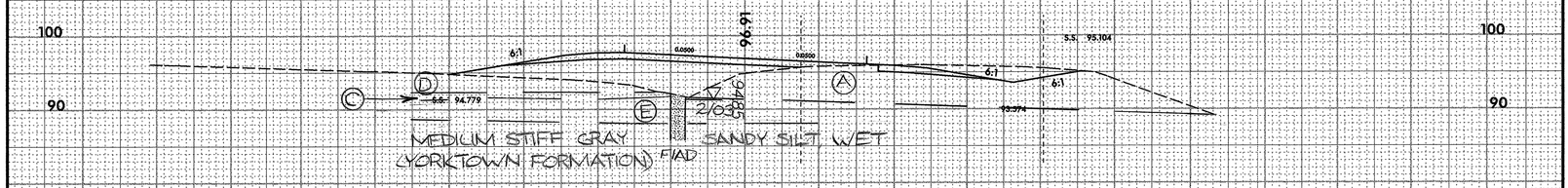

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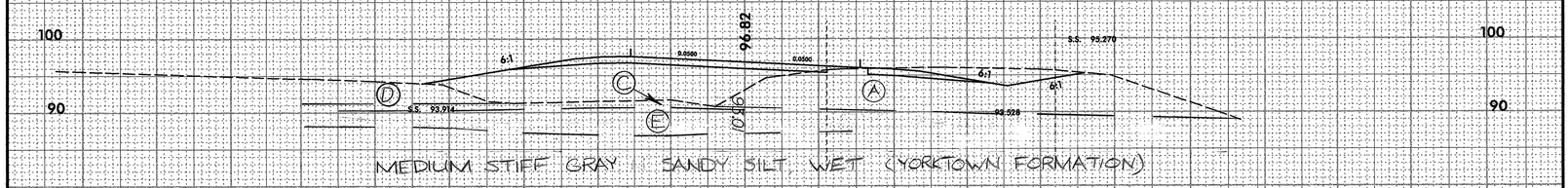

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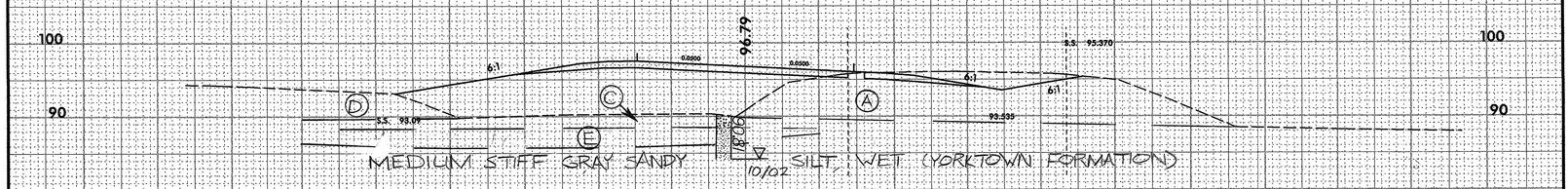

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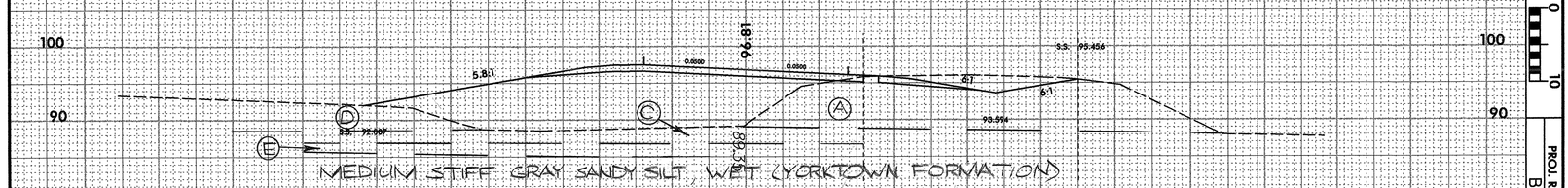

33+50.00

PROJ. REFERENCE NO. B-3453

SHEET NO. 14

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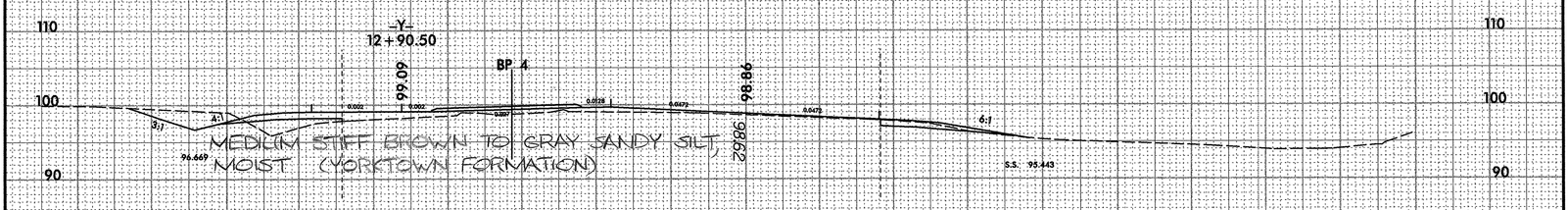
Rev 12/12/00

Ⓐ ROADWAY EMBANKMENT MEDIUM DENSE BROWN-GRAY SAND WITH GRAVEL, MOIST
Ⓔ VERY SOFT TO SOFT BROWN AND GRAY SANDY SILT, SATURATED (YORKTOWN FORMATION)



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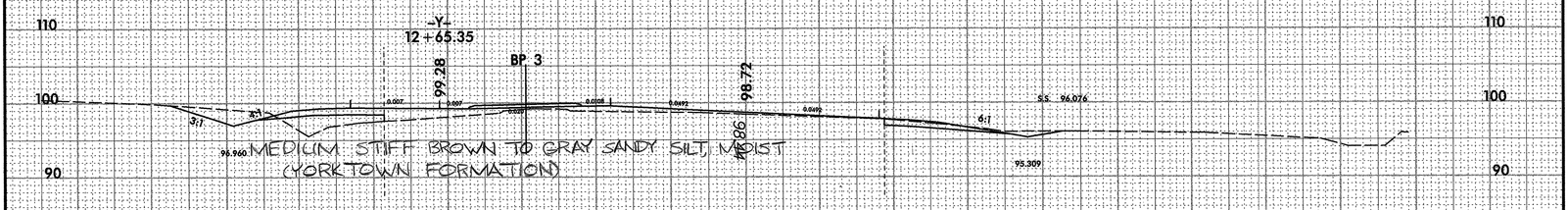
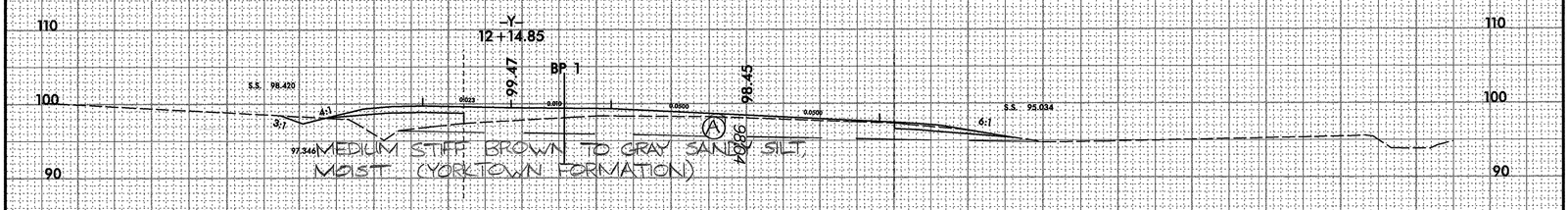


38+75.00

38+50.00



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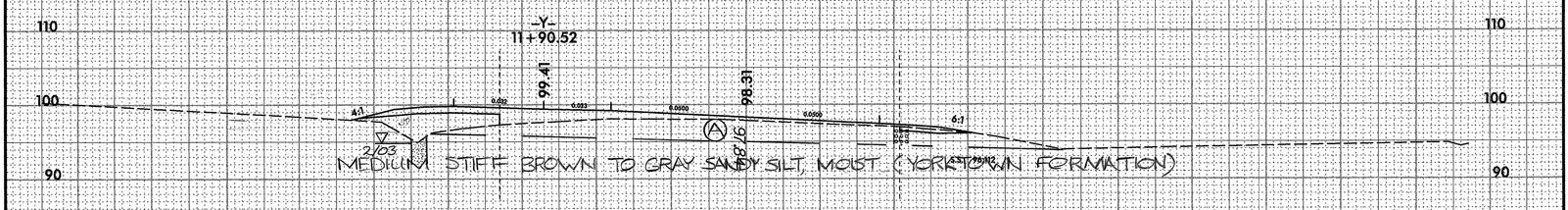

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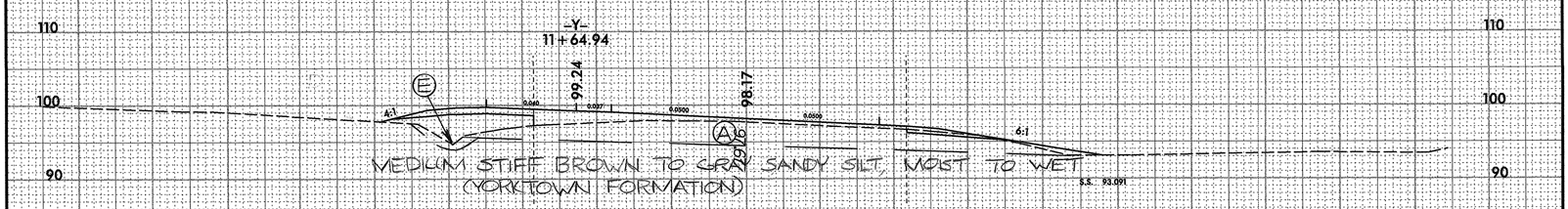

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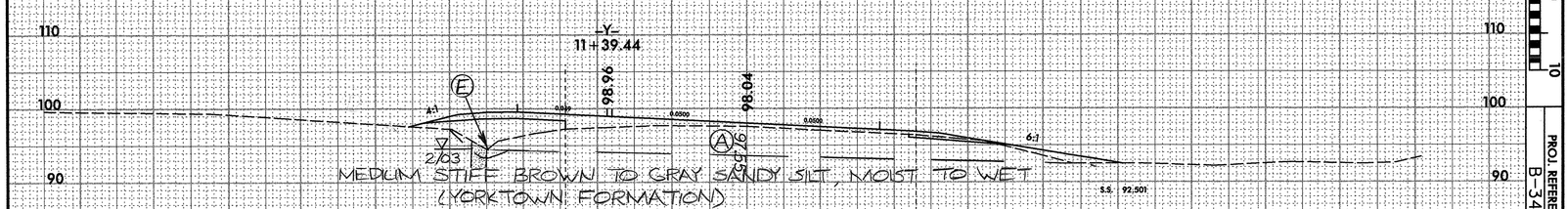

37+50.00

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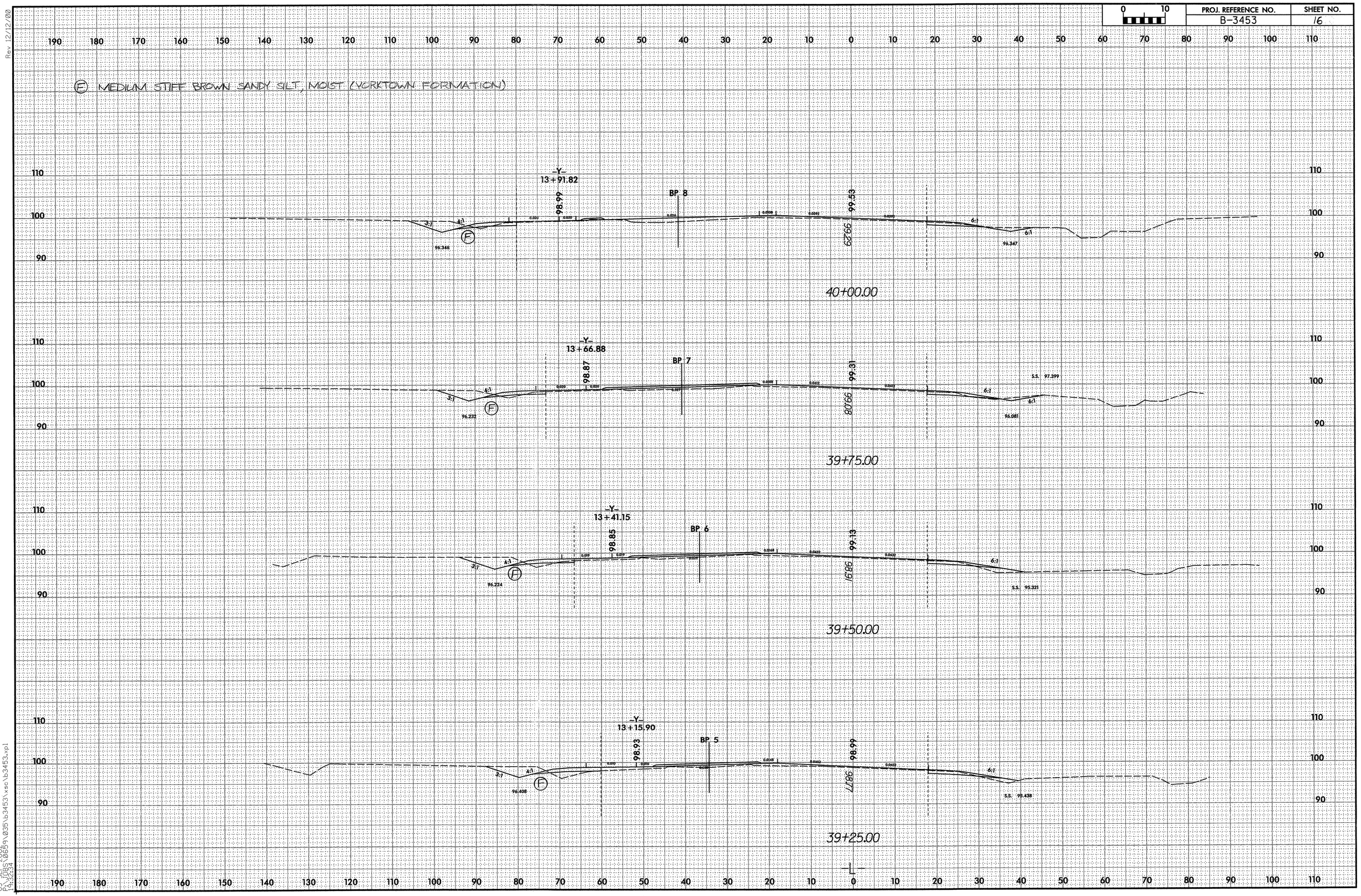
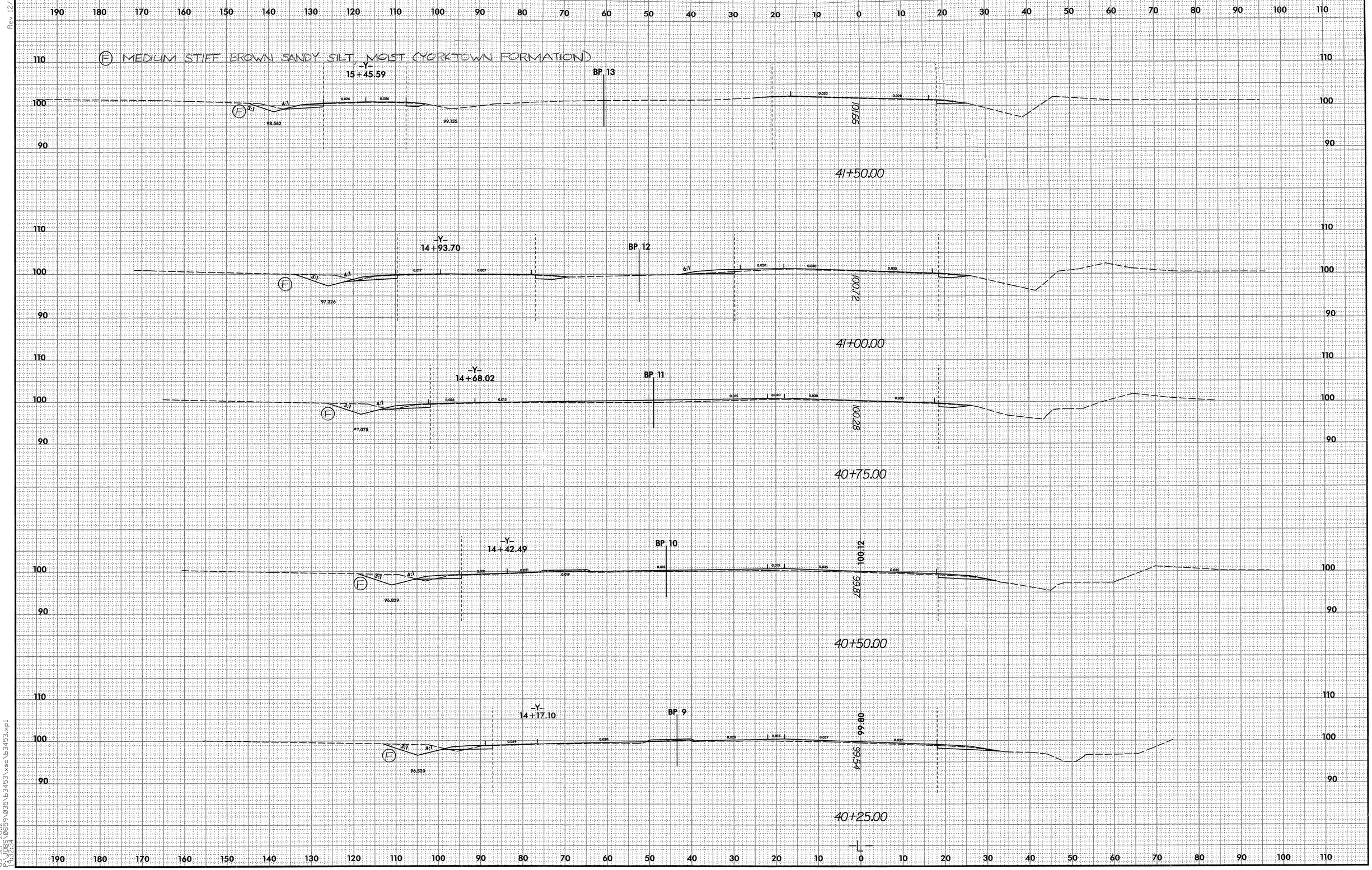
PROJ. REFERENCE NO. B-3453

SHEET NO. 15

PROJ. REFERENCE NO.	SHEET NO.
B-3453	16



PROJ. REFERENCE NO.	SHEET NO.
B-3453	17



Rev 12/12/00

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